AUSTRALIA

Form 1

PATENT APPLICATION FORM (NON CONVENTION)

APPLICATION ACCEPTED AND AMENDMENTS ALLOWED 16/8/83

AUSTRALIA Patents Act 1952-1973

532414

APPLICATION FOR A PATENT

COMPLETE AFTER PROVISIONAL SPECIFICATION No. 58903/80

(a) Insert full name(s) of applicants.

I/We(a) DAVID ADRIAN LEWIS and VICTOR MARCUS LEWIS

58903/80

(b) Insert address(es) of applicant(s).

of(b) 15-19 BOUNDARY STREET, RUSHCUTTERS BAY N.S.W. 2011

(c) Insert title of invention.

hereby apply for the grant of a Patent for an invention entitled (c) PROCESSED VEGETABLES

which is described in the accompanying provisional specification.

11 JUL 1979

My/Our address for service is: C/o Arthur S. Cave & Co., Patent Attorneys, 1 Alfred Street, Sydney, 2000, in the State of New South Wales, Australia.

(d) Insert date Form signed.

DATED this (d)10th day of July 1979

( ) Signature(s) of applicant(s). If a company to be executed in a manner binding on the company (according to its Articles of Association).

(e) DAVID ADRIAN LEWIS and VICTOR MARCUS LEWIS by their Patent Attorneys ARTHUR S. CAVE & CO.

(f) Seal, if any.

(f)

PATENT OFFICE

TEN DOLLARS

J.G. SIELLY, FIPAA

To:

THE COMMISSIONER OF PATENTS.

ARTHUR S. CAVE & CO.
PATENT AND TRADE MARK ATTORNEYS
SYDNEY

RECEIVED Date 4.7.79 Receipt 80745 Application / Declaration / Specification 1/1 Drawings /

ASC-1

PATENT DECLARATION (NON-CONVENTION)

Regulation 12(1)

COMMONWEALTH OF AUSTRALIA

Patents Act 1952

DECLARATION IN SUPPORT OF AN APPLICATION FOR A PATENT

(a) Insert full name(s) of applicants.

In support of the Application made by (a) DAVID ADRIAN LEWIS and VICTOR MARCUS LEWIS

(b) Insert title of invention.

for a patent for an invention entitled: (b) PROCESSED VEGETABLES

(c) Insert full name(s) of declarant(s).

I/We (c) DAVID ADRIAN LEWIS and VICTOR MARCUS LEWIS

(d) Insert address(es) of declarant(s).

of (d) 19A Boundary Street, Rushcutters Bay, New South Wales, 2011, Australia

do solemnly and sincerely declare as follows:–

1. I/We are the applicant(s) for the patent.

~~(c) In case of an application by a body corporate.~~

(e) Insert name of body corporate.

~~1. I am/We are authorized by (e) ..... the applicant for the patent to make this declaration on its behalf.~~

2. I/We are the actual inventor(s) of the invention.

~~2. (f) ..... of (g) ..... is/are the actual inventor(s) of the invention and the facts upon which the applicant(s) is/are entitled to~~

(f) Insert full name(s) of actual inventor(s).

(g) Insert address(es) of actual inventor(s).

~~(h) Set out how applicant(s) derive(s) title from actual inventor(s), i.e. assignee of the invention from the actual inventor(s).~~

Declared at Sydney this 10th day of July 198 3

DAVID ADRIAN LEWIS .....

VICTOR MARCUS LEWIS .....

Signature of Declarant(s)

To:
The Commissioner f Patents

ARTHUR S. CAVE & CO.
PATENT AND TRADE MARK ATTORNEYS
SYDNEY

(12) AUSTRALIAN PATENT ABRIDGMENT
(19) AU (11) AU-B-58903/80

(54) PROCESSED VEGETABLES

(75) DAVID ADRIAN LEWIS AND VICTOR MARCUS LEWIS

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(57) A product produced by the process is also claimed

Claim

1. A process for dehydrating a vegetable to a desired moisture content and a water activity level at 20°C of from 0.45 to 0.85, comprising the steps of:

(a) partially dehydrating said vegetable, allowing 10%-55% r sidual moisture to remain;

(b) adding to and mixing with the partially dehydrated veg table a predetermined volume, [a] of an aqueous solution containing a known quantity of at least one water activity controlling solute selected from the group consisting of sodium chloride and mixtures of sodium chloride and a sugar, said solution containing no other solutes other than flavorings, coloring substances,

.../2

seasonings, preservatives, salts, nutritional supplements and anti-oxidants, the quantity of said solution being such that it is totally absorbed by said partially dehydrated vegetable, and the absorption being carried out above 10°C; and

(c) dehydrating said vegetable to a predetermined moisture content and said water activity level in a final dehydration step, the amounts of sugar and sodium chloride in said solution being such that the sugar content of the final dehydrated vegetable is 0 to 17% and the sodium chloride content is 3-15%.

532414

AUSTRALIA

PATENTS ACT 1952-1973

COMPLETE SPECIFICATION
(ORIGINAL)

This document contains the amendments made under Section 19.

and is correct for printing

FOR OFFICE USE

Application Number: 58903/80
Lodged:

Complete Specification Lodged:
Accepted:
Published:

This document contains the amendments allowed under Section 88 (2) by the Supervising Examiner on

and is correct for printing

Priority:
Related Art:

TO BE COMPLETED BY APPLICANT

Name of Applicant: DAVID ADRIAN LEWIS and VICTOR MARCUS LEWIS

Address of Applicant: 15 - 19 BOUNDARY STREET, RUSHCUTTERS BAY, New South Wales,

Actual Inventor: AS ABOVE

Address for Service: C/- ARTHUR S. CAVE & CO., Gold Fields House, 1 Alfred Street, Sydney, N.S.W. 2000

Complete Specification for the invention entitled

PROCESSED VEGETABLES

The following statement is a full description of this invention, including the best method of performing it known to me:-

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ASC-49

The present invention relates to a process for the dehydration of vegetables whereby pre-determined quantities of solutes are accurately incorporated into vegetables to produce dehydrated products with relatively high moisture content and high stability. In general the dehydrated products are produced having water activities between 0.45 and 0.85 at 20°C.

As is recognised in the art, water activity is a significant factor in controlling microbial growth. A discussion of water activity and its significance in this respect may be found, for instance, in Potter, "Food Science", second edition, 1973, The Avi Publishing Co., Westport, Connecticut, at pages 147 and 289 through 293.

The dehydrated vegetables produced according to the present invention are stable and have a more rapid rehydration time, improved colour, flavour and texture, higher moisture content and lower production cost.

The term "vegetables" as used herein denotes all types of vegetables including the leaves, roots, bulbs and stems thereof, and fruit.

The expression "water activity-controlling solute" includes but is not limited to salts (for example sodium chloride), sugars (for example sucrose, dextrose, sugar derivatives and the like), soluble protein hydrolysates, polyalcohols (for example glycerol) and mixtures thereof.

Of recent years there has been a considerable increase in demand for dried packaged convenience foods such as soups, risottos and casseroles. These packaged foods n rmally contain dehydrated vegetables of various types,

which desirably should rapidly rehydrate. For packs of good quality, it is not unusual for manufacturers to use freeze-dried vegetables. These however, are quite expensive, largely as a result of the high cost of capital equipment and high energy usage associated with their processing. They also must be maintained at a low moisture content, and if co-packed with cereals, pasta, etc., these other major ingredients must be reduced in moisture to be compatible with the dehydrated vegetables. In addition because of their need to be maintained at a low moisture content, sophisticated packaging materials must be used for their storage and distribution. A similar situation exists with conventionally hot-air dried vegetables, but these suffer additionally from slow rehydration time and poor flavour and texture.

In the normal air-drying of vegetables, approximately 75% of the moisture is removed during the first 25% of the drying time. In the final 75% of the drying time, a mere 20% of the original moisture is removed. In the final 75% of the drying time most of the flavour, texture and colour loss occurs. Moreover, because of high energy input and slow throughput through capital intensive equipment such processes have proved to be expensive. With most common vegetables, maximum moisture content after dehydration is approximately 5% but good commercial practice is for the moisture content to be considerably lower and this of course prolongs the time of processing of vegetables treated in this manner.

We have found that by introducing solutes (as d fined hereinbefore) into vegetables, the water activity of the dried product can be substantially reduced so that shelf-stable "intermediate moisture" dried products can be prepared. These products, when boiled with water, or when boiling water is poured on to them, rehydrate more rapidly because they start off at a higher moisture content, and also because of the presence of solutes, which induce more rapid intake of water into the vegetable tissue.

The addition of solutes to processed vegetables is not new per se. The preservation of fresh vegetables with salt has been practised for hundreds of years. More recently various methods have been published wherein salt is introduced in vegetables prior to drying by blanching the vegetables in salt solutions, or by steeping the vegetableseither before or after drying in salt, sugar or other solutions. These methods have not found favour or commercial benefit because of the disadvantages encountered in employing such methods. Firstly, they are awkward to use in practice. More importantly, it is very difficult to adequately control the amount of solute intake from the solutions. Hence, the processed vegetables contain an unknown quantity of the added solute and in order to determine the amount of added solute, it is necessary to analyse the vegetables. Because the amount of solute intake cannot be ascertained quickly, such methods are not convenient or economical. Another disadvantage of such methods is that the steep solutions become contaminated and are difficult t effectively recycle. This can represent a

con id rabl wa tage.

The obj ct of the pres nt invention i to provide a simple, but reliable, process for the dehydration of vegetables wherein the quantity of solutes introduced into the vegetables can be controlled within very fine limits. The present invention is an advance in the art of dehydrating vegetables, as it overcomes problems, in particular the problem of controlling the amount of solute intake, associated with such processes as used hitherto.

In its broadest aspect, the present invention provides a process for dehydrating a vegetable to a desired moisture content and a water activity level at 20°C of from 0.45 to 0.85, comprising the steps of:

(a) partially dehydrating said vegetable, allowing 10%-55% residual moisture to remain;

(b) adding to and mixing with the partially dehydrated vegetable a predetermined volume, [a] of an aqueous solution containing a known quantity of at least one water activity controlling solute selected from the group consisting of sodium chloride and mixtures of sodium chloride and a sugar, said solution containing no other solutes other than flavorings, coloring substances, easonings, preservatives, salts, nutritional supplements and anti-oxidants, the quantity of said solution being such that it i t tally absorbed by said partially d hydrat d

vegetable, and th absorption being carried out above 10°C; and

(c) dehydrating said vegetable to a predetermined moistur content and said water activity level in a final dehydration step, the amounts of sugar and sodium chloride in said solution being such that the sugar content of the final dehydrated vegetable is 0 to 17% and the sodium chloride content is 3-15%.

It may be possible with some vegetables, particularly where salt alone is added, to dehydrate to a predetermined moisture content and add sufficient saturated brine to bring the final moisture content and water activity to the desired levels.

The dehydrated vegetables produced by the process according to the invention are highly stable and have known solute, water activity and moisture levels. In addition the moisture level is considerably higher than those conventionally employed. They also have a more rapid rehydration time, improved colour, flavour and texture when rehydrated, and a lower production cost.

The present invention will now be described with reference to preferred forms thereof. As a prelude to the ensuing description, it is specifically mentioned that all details thereof are intended to be merely illustrative of th invention.

Vegetabl uch a onion , carrot and cabbag ar pr pared for dehydration by cutting in the conv ntional way into slices, cubes, strips etc. Other vegetables, such as peas, fresh lima beans, and black-eyed peas, are left whole. Where desired, the vegetables may be blanched in water or steam. The vegetables are placed in the dehydrator on trays or on a continuous belt or in other such manner as is required in the proper operation of equipment.

The partially dried vegetables are removed from the dehydrator during the stage when rapid dehydration of moisture is occuring or has just occurred. The stage of removal will vary from product to product but will be when 10-55% residual moisture remains in the vegetables. This stage is selected so that the semi-dried vegetables are highly absorptive of liquids and solutes introduced into

them by intimately mixing them with the precalculated quantity of solutes in a minimal quantity of water. The quantity of solutes is determined from a knowledge of the original solids content of the vegetables, and the predetermined composition required in the final product. Moisture contents of the vegetables can be monitored continuously with *meters. Continuous weighing of the vegetable stream which may be coupled to a metering pump allows very accurate addition of the required volume of solute-containing solution.

The solute-containing solution may simply contain one solute, for example sodium chloride or it may contain a mixture of two or more solutes, for instance, sodium chloride and dextrose. In addition at this stage food additives such as flavourings, colouring substances, seasonings, preservatives, nutritional supplements, anti-oxidants, etc. may optionally be added. The solute-containing solution may be mixed with the vegetables in any convenient mixer such as a tumbler-mixer or a continuous paddle mixer. The added solution is totally absorbed very rapidly the more so if the vegetables are still warm from the dryer. The temperature of the solution is not critical. The solution may be at room temperature or it may be heated. Although not essential to the performance of the invention, it is pref rred to allow a tempering period of from 5 to 30 minutes in which the vegetable pieces are allowed to stand after the solution has been absorbed before these pieces are subjected to a final drying where this is required. This allows a more

uniform penetration of the solutes throughout the vegetable pieces.

The final step in dehydration which in certain circumstances may not be necessary, may be achieved in either a conventional continuous dryer or in a bin dryer. If a bin dryer is used, it allows the more even final drying of pieces of vegetable of different sizes to a more uniform final moisture content. However, we have found that even if final rapid drying of the vegetables is achieved to the predetermined moisture content, uniform equilibration of water activity throughout the pieces occurs during storage.

We have found in practice that highly stable dried vegetable products can be produced by employing salt (sodium chloride) solutions or solutions of salt and sugar having final salt contents in the vegetables of 3-15% sugar contents of less than 15% (where no sugar is employed) and final moisture contents of 6-25%. The water activity of the dehydrated product should ~~desirably~~ be within the range of 0.45 to 0.85 at 20°C. The desirable moisture and added solutes level is determined by the purpose for which the vegetables are to be used. Many dried vegetables today are used as a garnish to add colour, flavour and texture to mixed dry packaged food products. Because the quantities of vegetables used in such a mix are relatively small, the high solid solutes content in the added vegetables is in no way objectionable. Vegetables prepared in this way cook very quickly both because of their high solutes content, their high moistur content, and because the cell structure

is not altered as much as when the vegetables are dried to 3 or 4% moisture. On rehydration, they retain their crispness and have a most desirable flavour. The solutes leach out very rapidly into the cooking water or into mixed dishes in which the vegetables are used.

The following examples illustrate the process according to the present invention.

EXAMPLE 1

MUSHROOMS

Five kilograms of fresh mushrooms containing 7% of solids were sliced to thickness of 4 mm and loaded onto dehydrator trays. The trays were dried in a cross-flow cabinet dryer with air temperature of 70°C until the net weight of the mushrooms was 389 g. and the moisture content 10%.

The mushrooms were removed from the dryer and tumbled with the addition of 149 ml. of saturated sodium chloride solution at ambient temperature until the solution was totally absorbed (about 3 minutes). They were then returned to the dryer and drying continued at 50°C for a short period of time until the final net weight was 497 g. The mushrooms then had a water content of 20%, a salt content of 9.5% and a water activity of 0.57 at 20°C.

EXAMPLE 2

CARROTS

Ten kilograms of whole carrots which had previously been peeled, washed and blanched in steam for seven minutes were found to have a total solids content of 10.2%. They were sliced into discs 3 mm in thickness and dried until

the net weight was 1160 g. and the moisture content 12%. They were removed from the dryer and mixed thoroughly with 338 ml. of a saturated sodium chloride solution at ambient temperature, to which had been added sufficient (1.4g.) of sodium metabisulfite to give a final SO_2 content of 500 p.p.m. The solution was almost immediately absorbed by the by the dried carrots, and they were allowed to stand for 15 minutes. They were then returned to the dryer and dried until the net weight was 1 342 g.

The finished product had a salt content of 8%, a moisture content of 16% and a water activity of 0.45 at 20°C.

EXAMPLE 3

ONIONS

Trimmed white onions with a solids content of 18% were sliced to a thickness of 3mm.

Five kg. of the sliced onions were placed on dehydrator trays and dried at 70°C to a net weight of 1 125 g., by which time the moisture content was 20%.

The onion pieces were transferred to a mixer and mixed with 353ml. of saturated sodium chloride solution at ambient temperature. The solution was absorbed by the onions in two minutes, after which they were allowed to stand for a further ten minutes. The onions were further dried at 50°C to a net weight of 1 177 g. The finished product had a moisture content of 14%, a sodium chloride content of 9.5% and a water activity of 0.45 at 20°C.

EXAMPLE 4

GREEN BEANS

Stringless green beans were cross cut to a length of 10 mm and blanched in steam for $2^{1}/_{2}$ minutes. The beans after blanching contained 10% total solids. 1095 g. of the blanched beans were dried to a net weight of 170 g. having at that time a moisture content of 36%.

The beans were removed from the dryer and tumbled with a solution made by dissolving 12 g. of salt., 0.8 g. of sodium sulphite, and 17 g. of dextrose monohydrate in 60 ml. of water at ambient temperature. The solution was absorbed by the semi-dried beans, and they were allowed to stand for 30 minutes before returning them to the dryer. They were then further dried for a short time to a final net wt. of 170 g.

The beans had a moisture content of 18% and a water activity of 0.55 at 20°C. They had excellent colour, flavour and texture.

In conclusion, it is reiterated that the foregoing description is simply illustrative of the invention, and obviously other modifications and variations of the present invention are possible in light of the above teachings. As long as the basic criteria are observed then all such matters not being critical in themselves, can vary and still be within the full intended scope of the invention.

The claims defining the invention are as follows:-

1. A process for dehydrating a vegetable to a desired moisture content and a water activity level at 20°C of from 0.45 to 0.85, comprising the steps of:

(a) partially dehydrating said vegetable, allowing 10%-55% residual moisture to remain;

(b) adding to and mixing with the partially dehydrated vegetable a predetermined volume, [a] of an aqueous solution containing a known quantity of at least one water activity controlling solute selected from the group consisting of sodium chloride and mixtures of sodium chloride and a sugar, said solution containing no other solutes other than flavorings, coloring substances, seasonings, preservatives, salts, nutritional supplements and anti-oxidants, the quantity of said solution being such that it is totally absorbed by said partially dehydrated vegetable, and the absorption being carried out above 10°C; and

(c) dehydrating said vegetable to a predetermined moisture content and said water activity level in a final dehydration step, the amounts of sugar and sodium chloride in said solution being such that the sugar content of the final dehydrated vegetable is 0 to 17% and the sodium chloride content is 3-15%.

2. A process according to claim 1 wherein the partial dehydration step is ceased when rapid dehydration of the vegetable is occurring or has occurred.

3. A process according to claim 1 or 2 wherein prior to st p (c) the vegetables are tempered to allow for uniform penetration of solutes therein.

4. A process according to any one of claims 1 to 3 wherein the vegetables are blanched in water or steam prior to step (a).

5. A process according to any one of claims 1 to 4 wherein the water activity controlling solute is sodium chloride.

6. A process according to any one of claims 1 to 4 wherein the final dehydrated vegetable product contains 3-15% sodium chloride, and 6-25% water.

7. A process according to any one of the claims 1 to 4 wherein sodium chloride and sugar are partly employed as the water activity controlling solutes and the final d hydrated vegetable product contains 3-15% sodium chloride le s than 15% sugar and 6-25% water.

8. A process according to any one of the preceding claims wh rein said solution of at least one water activity controlling solute also contains at least one additive lected from the group consisting of flavourings, colouring substances, seasoning, preservatives, nutritional upplements and anti-oxidants.

9. A process according to claim 1 substantially as hereind scribed with ref renc to any one of the foregoing exampl s.

10. Dehydrated vegetabl prepared by the process according to any one of the pr ceding claims.

DATED this 6th day of July 1983.

DAVID ADRIAN LEWIS and
VICTOR MARCUS LEWIS
By Their Attorneys,
ARTHUR S. CAVE & CO.